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PETITION FEE Under 37 CFR 1.17(f), (g) & (h) TRANSMITTAL (Fees are subject to annual revision) Send completed form to: Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450	Application Number	10/767,196
	Filing Date	January 30, 2004
	First Named Inventor	H. SATO, et al
	Art Unit	
	Examiner Name	
	Attorney Docket Number	501.43402X00


Enclosed is a petition filed under 37 CFR §1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of \$ 130.00 is enclosed.

This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees))

- ☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. 50-1417:
- ☐ petition fee under 37 CFR 1.17(f), (g) or (h) ☒ any deficiency of fees and credit of any overpayments
- Enclose a duplicative copy of this form for fee processing.
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Petition Fees under 37 CFR 1.17(f):	Fee \$400	Fee Code 1462
For petitions filed under:		
§ 1.53(e) - to accord a filing date.		
§ 1.57(a) - to according a filing date.		
§ 1.182 - for decision on a question not specifically provided for.		
§ 1.183 - to suspend the rules.		
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.		
§ 1.741(b) - to accord a filing date to an application under §1.740 for extension of a patent term.		
Petition Fees under 37 CFR 1.17(g):	Fee \$200	Fee code 1463
For petitions filed under:		
§1.12 - for access to an assignment record.		
§1.14 - for access to an application.		
§1.47 - for filing by other than all the inventors or a person not the inventor.		
§1.59 - for expungement of information.		
§1.103(a) - to suspend action in an application.		
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.		
§1.295 - for review of refusal to publish a statutory invention registration.		
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.		
§1.377 - for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.		
§1.550(c) - for patent owner requests for extension of time in <u>ex parte</u> reexamination proceedings.		
§1.956 - for patent owner requests for extension of time in <u>inter partes</u> reexamination proceedings.		
§ 5.12 - for expedited handling of a foreign filing license.		
§ 5.15 - for changing the scope of a license.		
§ 5.25 - for retroactive license.		
Petition Fees under 37 CFR 1.17(h):	Fee \$130	Fee Code 1464
For petitions filed under:		
§1.19(g) - to request documents in a form other than that provided in this part.		
§1.84 - for accepting color drawings or photographs.		
§1.91 - for entry of a model or exhibit.		
§1.102(d) - to make an application special.		
§1.138(c) - to expressly abandon an application to avoid publication.		
§1.313 - to withdraw an application from issue.		
§1.314 - to defer issuance of a patent.		

Name (Print/Type)	Carl I. Brundidge	Registration No. (Attorney/Agent)	29,621
Signature		Date	March 16, 2005

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1460, Alexandria, VA 22313-1460.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: H. SATO, et al

Serial No.: 10/767,196

Filed: January 30, 2004

For: DISK ARRAY DEVICE HAVING SPARE DISK DRIVE AND DATA
SPARING METHOD**PETITION TO MAKE SPECIAL
UNDER 37 CFR §1.102(MPEP §708.02)****MS Petition**Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

March 16, 2005

Sir:

Applicants hereby petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d). Pursuant to MPEP §708.02(VIII), Applicants state the following.

(A) This Petition is accompanied by the fee set forth in 37 CFR §1.17(h).

The Commissioner is hereby authorized to charge any additional payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) All claims are directed to a single invention.

If the Office determines that all claims are not directed to a single invention, Applicant will make an election without traverse as a prerequisite to the grant of special status.

(C) A pre-examination search has been conducted.

The search was directed towards a storage system. In particular, the search was directed towards a disk array device which can be connected to a host for communication with each other, a method for use in the disk array device and a data sparing control device for use in the disk array device.

The disk array device according to the present invention includes a disk control unit which performs control of the entire disk array device, a host side data transfer control unit which controls data transfer to and from the host device, data disk drives which constitute one parity group and at least one spare disk drive. The one parity group has a large number of data stripes which are formed over storage areas of plural data disk drives and the large number of data stripes can be partitioned into at least two sets of data stripes. The disk array also includes a cache memory which is used for temporary storage of data to be transferred between the host device and the disk array device and a subordinate side transfer unit which controls data transfer to and from the disk array.

According to the present invention, the disk array control unit includes a prediction section which predicts the likelihood of occurrence of a failure for each data disk drive and a divided data copy section which selects at least two data disk drives out of the data disk drives as objects of divided data copy according to the predicted likelihood of occurrence of a failure, selects at least two divided storages areas by selecting one divided storage area for each of the selected at least two data disk drives, the selected at least two divided storages areas belonging to different sets of the data stripes and the parity group, and controls

the subordinate side transfer control unit and the cache memory so as to copy data in the selected at least two divided storage areas to the at least one spare disk drive.

The method of the present invention operates in the disk array device as described above including the disk array control unit, host side data transfer control unit, disk array, cache memory and subordinate side transfer control unit. According to the present invention, the disk array control unit operates to spare data in the data disk drive using the spare disk drive.

The method according to the present invention includes predicting the likelihood of occurrence of a failure for each of the disk drives, selecting at least two data disk drives as objects of divided data copy out of the plural data disk drive according to the predicted likelihood of occurrence of a failure, selecting at least two divided storage areas by selecting one divided storage area from each of the selected at least two data disk drives, wherein the selected at least two divided storage areas belong to different sets of data stripes in the parity group and performing the divided data copy by controlling the subordinate side transfer control unit and the cache memory to copy data of the selected at least two divided storage areas to the at least one spare disk drive.

The data sparing control device according to the present invention operates in the disk array device described above with respect to the method of the present invention. The data sparing control device includes a prediction unit which predicts the likelihood of occurrence of a failure for each of data disk drives, a divided area selection unit which selects at least two data disk drives as

objects of divided data copy of the plural data disk drives according to the predicted likelihood of occurrence of a failure and selects at least two divided storage areas by selecting one divided storage area from each of the selected at least two data disk drives wherein the selected at least two divided storages areas belong two different sets of data in the parity group and a divided data copy unit which controls the subordinate side transfer control unit and the cache memory so as to copy data of the selected at least two divided storage areas to the spare disk drives.

The search of the above features was conducted in the following areas:
Class 711, subclasses 112, 114, 162.

Additionally, a computer database search was conducted on the USPTO systems EAST and WEST.

(D) The following is a list of the references deemed most closely related to the subject matter encompassed by the claims:

<u>U.S. Patent No.</u>	<u>Inventors</u>
6,223,252	Bandera et al

<u>U.S. Patent Application Publication No.</u>	<u>Inventor(s)</u>
2003/0088803	Arnott et al

A copy of each of these references (as well as other references uncovered during the search) is enclosed in an accompanying IDS.

(E) It is submitted that the present invention is patentable over the references for the following reasons.

It is submitted that the cited references, whether considered alone or in combination, fail to teach or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to teach or suggest a first feature of the present invention wherein the likelihood of occurrence of a failure for each of the disk drives is predicted and based on the predicted likelihood of occurrence of a failure at least two data disk drives are selected as objects of divided data copied out of the data disk drives, a second feature of the present invention as recited in the claims wherein at least two divided storage areas are selected by selecting one divided storage area from each of the selected at least two data disk drives wherein the selected at least two divided storage area belong to different sets of data stripes in the parity group, and a third feature of the present invention as recited in the claims wherein the copying of the divided data is performed by controlling the subordinate side transfer control unit and the cache memory so as to copy data of the selected at least two divided storage areas to the at least one spare disk drive.

Each of the independent claims namely claims 1, 11 and 20 recite the above described first, second and third features of the present invention.

The references considered most closely related to the claimed invention are briefly discussed below:

Bandera (U.S. Patent No. 6,223,252) shows a hot spare light weight mirror for raid system with the selected data drive selected to be mirrored on the hot

spare drive as a data drive within the drive array selected utilizing predictive failure analysis. A hot spare drive within a disk array mirrors writes to a selected drive within the disk array, the hot spare remains available for failure recovery when a different drive other than the mirrored drive fails. (See summary and claim 18).

However, Bandera fails to teach or suggest the above described first, second and third features of the present invention as recited in the claims.

Arnott (U.S. Patent Application Publication No. 2003/0088803) shows rebuilding of redundant disk arrays using distributed hot spare space with redundant array of independent disk configuring and rebuilding method that involves allocating free blocks as hot spare space blocks to enable rebuilding of failed blocks in free blocks of remaining drives after failure. (See paragraphs 9-12 and 45-48).

However, Arnott fails to teach or suggest the above described first, second and third features of the present invention as recited in the claims

Therefore, since the above described references and the other references of record fail to teach or suggest the above described first, second and third features of the present invention as recited in the claims, it is submitted that all of the claims are patentable over the cited references and the other references of record whether taken individually or in combination with each other.

(F) Conclusion

Applicant has conducted what it believes to be a reasonable search, but makes no representation that "better" or more relevant prior art does not exist.

The United States Patent and Trademark Office is urged to conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the United States Patent and Trademark Office may locate in its own independent search. Further, while Applicant has identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is patentable over the references, the United States Patent and Trademark Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

(G) Fee (37 C.F.R. 1.17(i))

The fee required by 37 C.F.R. § 1.17(i) is to be paid by:

☒ the Credit Card Payment Form (attached) for \$130.00.

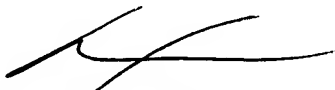
☐ charging Account _____ the sum of \$130.00.

A duplicate of this petition is attached.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.,
Deposit Account No. 50-1417 (501.43402X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



Carl I. Brundidge
Reg. No. 29,621

CIB/jdc
(703) 684-1120